

## **APPENDIX B.3 MAUMEE SERVICE AREA**

### **ELEMENT 1. SERVICE AREA DESCRIPTION**



The Maumee Service Area (SA) is located in northeastern Indiana and is composed of the following four 8-digit HUCs:

- 04100003 - St. Joseph
- 04100005 - Upper Maumee
- 04100007 - Auglaize
- 04100004 - St. Marys

The Maumee SA includes portions of the six Indiana counties listed below in the Maumee Lake Plain Region as well as the Northern Moraine and Lake Region physiographic regions. The Maumee Lake Plain Region is contained within Allen County only.

Steuben	Noble	Wells
DeKalb	Allen	Adams

Major rivers and streams of the Maumee SA include the St. Marys, St. Joseph, and Maumee Rivers. The St. Marys River begins in northwestern Ohio where it flows north to Fort Wayne, Indiana and converges with the St. Joseph River to form the Maumee River; the Maumee River flows 150 miles northeast where it drains to Lake Erie.

Draining approximately 821,671 acres of northeastern Indiana, the Maumee SA is mainly located within the Eastern Corn Belt Plains ecoregion and is characterized by rolling till plains where original beech forests and scattered elm-ash swamp forests have been replaced by farming; soils in this ecoregion are good for cropland. A smaller section of the SA located within Allen County is part of the Huron/Erie Lake Plains ecoregion, more specifically the Maumee Lake Plains sub-region, and is characterized by broad plains interspersed by sand dunes, end moraines, and beach ridges; the Maumee Lake Plains are poorly-drained and contain fertile soil. Elm-ash and beech forests have been replaced by drained farmland, and agricultural activities as well as ditching have greatly degraded the habitats and water quality of the Upper Maumee's aquatic systems (U.S. EPA: Ecoregions of Indiana).

Based on the 2011 NLCD, the land cover type with the greatest area in the Maumee SA is agricultural land use (72%), followed by developed and impervious land use (15%), forest and shrub/scrub (8.4%), and wetlands and open water (3.73%) (Homer, et al., 2015). Woody wetlands are the prominent wetland type and range from approximately 2.12% of SA cover per the NWI to 2.41% per the 2011 NLCD. Emergent herbaceous wetlands range from approximately 0.35% per the 2011 NLCD to 0.82% per the NWI.

## ELEMENT 2. THREATS TO AQUATIC RESOURCES

Aquatic resource threats specific to the Maumee SA (SA) have been identified using the same approach as the statewide portion of the CPF. As objectively as possible, the threats are generally presented in the order of the current predominance within the SA.

### 2.1 Section 404 Permitted Impacts

The Corps Section 404 permit data for impacts that required mitigation in the Maumee SA from 2009 – 2015 was collected and analyzed (**Table 37**). According to the data, 43.8 acres of impacted wetlands and 10,141 linear feet of impacted streams required mitigation in the seven year time period.

The transportation and service corridor work type accounted for the most stream impacts (85.43%), followed by development (14.57%). There were no documented stream impacts requiring mitigation for agricultural land uses, dam related activities, or energy production and mining for this time period.

The transportation and service corridor work type accounted for the most wetland impacts (79.74%), followed by development (18.92%), and dam related activities (1.34%). There were no documented wetland impacts requiring mitigation for energy production and mining, or agricultural land use for this time period. Locations of the permitted stream and wetland impacts are provided in **Figure 44**.

Work Type	Authorized Stream Impacts – Linear Feet	Percent of Stream Impact per Category	Authorized Wetland Impacts - Acres	Percent of Wetland Impact per Category
Agriculture	0	0.00%	0	0.00%
Dam	0	0.00%	0.587	1.34%
Development	1,478	14.57%	8.283	18.92%
Energy Production	0	0.00%	0	0.00%
Transportation	8,663	85.43%	34.912	79.74%
<b>Grand Total</b>	<b>10,141</b>	<b>100.00%</b>	<b>43.782</b>	<b>100.00%</b>

Table 37. Authorized 404 stream and wetland impacts requiring mitigation by work type category, 2009 – 2015. Source: USACE Louisville and Detroit Districts

# Maumee Service Area

## 404 Permitted Aquatic Resource Impacts Requiring Mitigation

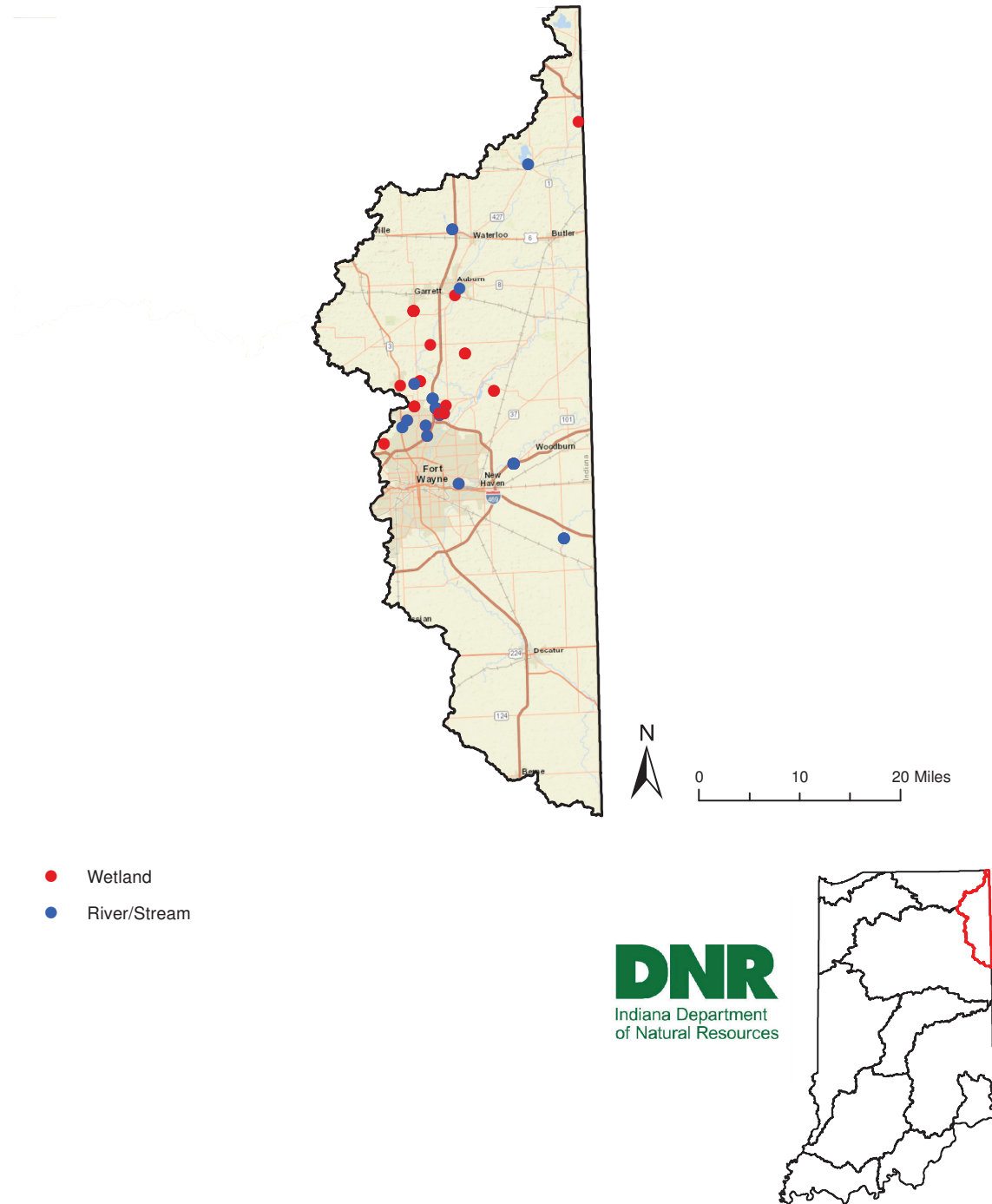


Figure 44. 404 permitted stream and wetland impacts requiring mitigation 2009- 2015

## 2.2 Land Cover and Land Use

In addition to 404 permitted work type categories, IDNR utilized the 2011 NLCD to identify land cover and land uses that contribute to aquatic resource and habitat impacts. Overall land cover within the Maumee SA is presented in **Figure 44**, and displays the geographical relationship of converted cover types relative to naturally occurring cover types.

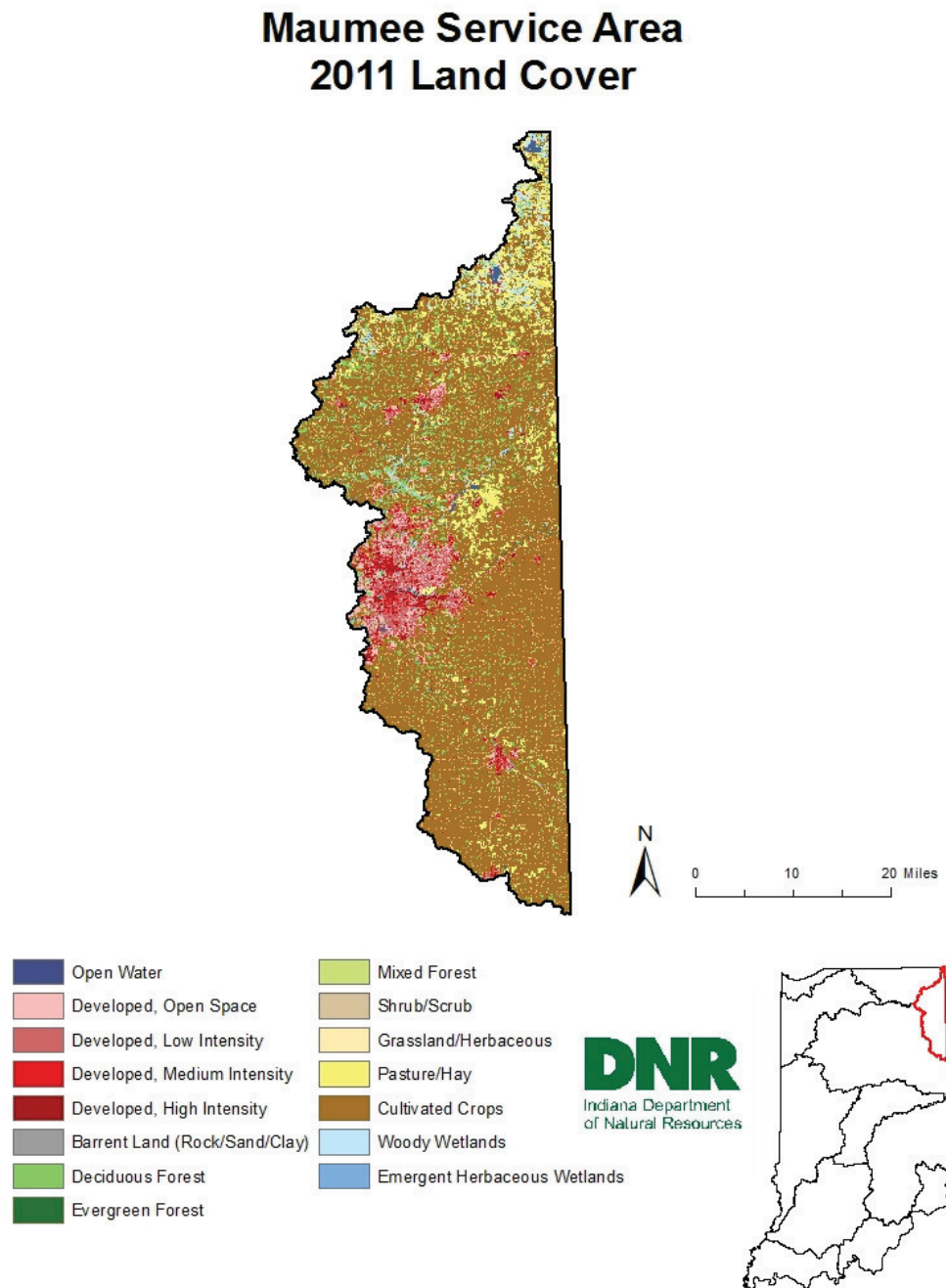


Figure 44. Land Cover in the Maumee Service Area (Homer, et al., 2015)

The land uses exhibited within the 2011 NLCD include multiple classes of cover, and some have additional values within specific classes based on variants or intensities within the classification (**Table 38**).

Maumee SA Land Cover			
Class	Value	Sum of Acres	Percent of Total Acres
Open Water	*	7,992	0.97%
Developed	Open Space	58,242	7.09%
Developed	Low Intensity	42,024	5/12%
Developed	Medium Intensity	15,990	1.95%
Developed	High Intensity	7,893	0.96%
Barren Land (Rock/Sand Clay)	*	546	0.07%
Forest	Deciduous	64,542	7.86%
Forest	Evergreen	997	0.12%
Forest	Mixed	64	0.01%
Shrub/Scrub	*	3,488	0.42%
Grassland/Herbaceous	*	5,733	0.70%
Pasture/Hay (Agriculture)	*	56,744	6.91%
Cultivated Crops (Agriculture)	*	534,474	65.07%
Wetlands	Woody	19,8234	2.41%
Wetlands	Emergent Herbaceous	2,872	0.35%
<b>Grand Total</b>		<b>821,425</b>	<b>100%</b>

Table 38. Maumee SA land cover classification/value percentages from 2011 National Land Cover Database (Homer, et al., 2015)  
\* Class does not have additional values

IDNR combined the values within the same land cover classification in **Figure 45** below to demonstrate the current overall land cover distribution of the SA.

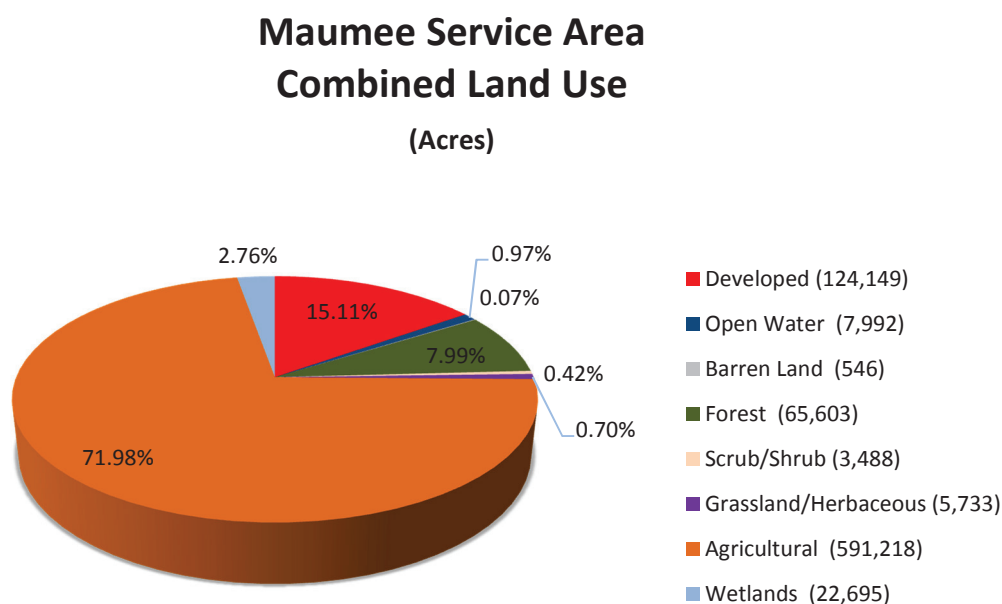


Figure 45. Combined land uses for the Maumee SA from the 2011 NLCD (Homer, et al., 2015)

### **2.3 Agriculture**

The 2011 NLCD demonstrates that the dominant land use in the Maumee SA is agricultural area covering approximately 591,218 (71.97%) of the SAs 821,424 total acres (Homer, et al., 2015). With the exception of the City of Fort Wayne, which is concentrated near the west central region, and other smaller developed footprints, agricultural land cover is the predominant land use throughout the Maumee SA boundary.

Within the identified land use areas, cultivated crops comprise 534,474 acres (60.07%) and pasture/hay lands cover 56,744 acres (6.91%) of the service area. Soybean production is the primary cultivated crop within the SA, followed by corn, based upon acres of harvested crops from counties that comprise the majority of the Maumee SA boundary (United States Department of Agriculture, 2016 and 2017).

Pasture/hay lands support livestock production from small to major livestock farming operations within the SA. Based on identified confined feeding operations (CFOs), which require a 5,000 animal unit minimum, pig farming CFOs are the predominant livestock industry within the Maumee SA (Thompson, 2008).

When combining these major agricultural land use activities, the Maumee SA ranks tenth in percentage of total statewide land use (2.56%), but it is the most significant land use within the SA.

### **2.4 Growth and Development**

Developed impervious area is the second largest land use category in the Maumee SA covering 124,149 (15.11%) of the 821,424 total acres, which is the fifth highest developed area density among all of the SAs.

In general, the most intensely developed impervious areas are most concentrated in the west central portion of the SA in Fort Wayne, with additional smaller footprints of dense development in communities such as Auburn, Decatur, and New Haven. The SA largely encompasses the Fort Wayne MSA, the third largest in the state with a 2010 population of 416,257 (Manns, 2013). Approximately 77% (323,091 acres) of Allen County's 422,400 acres fall within the Maumee SA, accounting for approximately 40% of total SA acres. Analysis of the INDOT cities and towns GIS data shows the Maumee SA contains entirely or in part 73 cities and/or towns, 20 of which are incorporated (INDOT, 2016).

Two Indiana Regional Councils that overlap the Maumee SA include the Northeastern Indiana Regional Coordinating Council (NIRCC) (89%) and Region III-A Economic Development District and Regional Planning Commission (11%) (IARC, 2017). In cooperation, these two regional councils completed a comprehensive economic development strategy for their 10 combined counties encompassing the northeast corner of the state (Region III-A, 2015).

Allen County is the largest county within Region III-A and NIRCC with a population of 363,014, or 53% of this area per the 2013 U.S. Census (Manns, 2013) because it includes the Fort Wayne MSA, impacting growth and development in the more intensely developed portions of the Maumee SA, while also driving growth in the Upper Wabash SA's. Though the Maumee SA does not entirely contain all the counties of these two regional councils, the population in this region has seen a total growth of 73% since 1950 to a 2010 population of 681,728 (Region III-A , 2015). Additionally, Steuben County accounted for 11.8%, and Noble County for 10.3%, of growth over the last decade in this region (Region III-A , 2015).

The largest employment sector in the region is manufacturing with 71,783 (25%) of the workforce. The automotive sector accounts for 21.4% of manufacturing employment in this region, including assembly, components fabrication, recreational vehicles and trailers. Other major manufacturing contributors are the medical devices and defense industries in addition to steady growth in food processing due to significant row crop and livestock operations supported by major grain and processing. These products range from dairy, eggs, poultry, specialty products, and have contributed to growth in agritourism, warehousing and distribution (Region III-A , 2015).

Other major employment sectors in the region are retail/wholesale trade (16%), health/educational services (14%), professional services (8%), financial/insurance and real estate (5%), construction (4%), transportation (3%), with leisure, information, natural resources, utilities, and other services accounting for the remaining 25% of employment. The construction industry is projected to account for 5% of total economic growth by 2020, a 24.1 increase in this sector (Region III-A , 2015).

Additionally, analysis of INDOT's local roads GIS (INDOT Road Inventory Section, 2016) data show there are approximately 4,917 miles of municipal and county roads contributing to the developed impervious land cover within the SA. The Maumee SA has the fourth highest local road miles to square mile ratio of the SA's at approximately 3.83 miles of local roads per square mile.

## **2.5 Transportation and Service Corridors**

### **2.5.1 Roads**

Based on INDOT GIS analysis of U.S. interstates and highways, state highways and local roads, there are approximately 640 miles of U.S. interstates and highways, 488 miles of state roads, and 4,917 miles of local roads within the Maumee SA (INDOT Road Inventory Section, 2016). Since this is the second smallest of all the SAs, the concentration of road miles per square mile of land within the SA is substantial.

U.S. Interstates and highways have a concentration of approximately 0.5 mile per square mile, which ranks sixth when compared to the other eleven service areas. The concentration of both local roads at 3.83 miles per square mile and the combination of all roads at 4.71 miles per square mile, rank fourth



compared to all SAs. In contrast, the concentration of state highways 0.38 mile per mile, which places it last when compared to the other SAs.

Although the concentration of state highways is low, when combined with all identified road types within the Maumee SA, the overall concentration of roads ranks near the top. The construction and maintenance of roads and bridges support the predominant mode of transportation and play an integral role in sustaining business and commerce throughout the region.

#### **2.5.2 Railroads**

Railroads provide an alternative mode of transportation within the Maumee SA. The SA has approximately 304 miles of railroads within its boundary (Federal Railroad Administration, 2002). These active railroads provide an important means of transportation for freight and passengers throughout the SA, state, and region. The Maumee SA contains the fourth greatest concentration of railroads with a density of 0.24 miles of railroad per square mile. The concentration of linear infrastructure throughout the SA poses a significant threat to aquatic resources in the form of habitat fragmentation, disruption to fluvial processes, resource degradation, habitat conversion and resource loss.

#### **2.5.3 Service Corridors**

Similar to threats identified with roads and railroads, the Maumee SA contains concentrations of service corridors. The SA has over 1,081 miles of service corridors throughout its boundary.

The SA contains a network of large kilovolt (kV) electric transmission lines that include one (12 kV) line, sixty (34.5 kV) lines, forty-eight (69 kV) lines, sixty-eight (138 kV) lines, twenty (345 kV) lines, and one (765 kV) line (Indiana Geological Survey, 2001). These electric transmission lines extend over 603 miles throughout the SA. When comparing the concentration of transmission lines per mile, the Maumee SA ranks fifth, with 0.47 miles of electric transmission lines per square mile.

In addition to electric transmission lines, the Maumee SA contains over 478 miles of pipelines; approximately 54 miles of pipelines that carry crude oil, 352 miles of pipelines that transport natural gas, and 72 miles of pipelines that carry refined petroleum products (Indiana Geological Survey, 2002). The Maumee SA contains the ninth largest concentration of crude oil and natural gas pipelines, and the tenth highest concentration of refined product pipelines.

#### **2.6 Dams and Non-Levee Embankments**

There are currently 5 known low head dams within the SA (IDNR DOW, 2016), the lowest statewide total, but the seventh highest concentration at one low head dam per 257 square miles. There are currently 13 state regulated high head dams (IDNR DOW, 2016) documented within the SA at a density of one dam per 99 square miles, the third least concentration comprising 1% of documented high head dams statewide.



Per the NLE GIS analysis (IDNR, 2016), there are approximately 137,280 linear feet (26 miles) of NLE's mapped within the SA, averaging one mile of NLE per 49 square miles, the eighth highest concentration among all SA's. Steuben County, which falls partially within the Maumee SA, was not included in the NLE identification project since it was not a declared disaster resulting from the 2008 severe weather events; therefore, the Maumee SA has additional NLE's that have not yet been mapped as part of this effort. Approximately 13.5 miles of the currently identified NLE's are located within predominantly developed areas with the remaining 12.5 miles mapped in rural agricultural settings.

## **2.7 Energy Production and Mining**

### **2.7.1 Natural Gas and Oil Production**

The Maumee SA contains active natural gas and oil production fields. The Indiana Geological Survey (IGS) identifies eight petroleum gas fields that include two active gas wells and forty-six abandon gas wells (Indiana Geological Survey, 2015). In addition, they identify four active oil fields that include four oil wells and sixty-seven abandon oil wells (Indiana Geological Survey , 2015).

Finally, the IGS identifies eight active oil & gas fields that include four oil & gas wells and eleven abandon oil & gas wells. Based upon the combined total of these active fields, the Maumee SA holds a statewide ranking of sixth for productive oil and natural gas fields (IGS-Petroleum Wells in Indiana, 2015). In addition to the Maumee SA oil and gas fields and related wells, the IGS petroleum well data identifies 158 dry wells, 152 stratigraphic wells, two active and one abandon salt water disposal wells and one temporarily abandoned well within the SA boundary (Indiana Geological Survey, 2015).

### **2.7.2 Mineral Mining and Aggregates**

The Maumee SA contains active mineral mining operations that extract and produce aggregate commodities. Based on the Indiana Geological Survey (IGS) 2016 active Indiana industrial mineral production data, the SA contains eight sand & gravel mining operations and four crushed stone operations (Indiana Geological Survey, 2016). Relative to the St. Joseph River SA size, mineral mining in the SA ranks seventh in the state with twenty-four active operations. Similar to the Calumet-Dunes SA, the IGS identified one slag operation, which utilizes the byproduct from steel mills as an aggregate (Indiana Geological Survey, 2016).

### **2.7.3 Coal**

The Maumee SA does not have recoverable coal reserves and contains no active surface or underground coal mines.

## **2.8 Indiana State Wildlife Action Plan (SWAP) Identified Threats**

The Maumee SA is located entirely within the Indiana SWAP Great Lakes Planning Region. The SWAP identifies the most significant threats to habitats and SGCN within the Great Lakes Region as:

- Habitat conversion and loss
- Natural systems modification
- Invasive species
- Dams
- Fish passage
- Point and non-point source pollution
- Water management and use
- Housing and urban areas
- Commercial and industrial areas
- Agriculture, aquaculture, livestock
- Roads and service corridors
- Changing frequency, duration, and intensity of drought and floods

The SWAP Great Lakes Region has experienced loss in the majority of habitat types over the last decade, primarily to urban development, which gained 6.2% in land cover (SWAP, 2015).

## **2.9 Anticipated Threats**

The existing land uses with the agricultural and developed impervious footprints make up approximately 87% of land use with the SA and are expected to remain as the top contributors to aquatic resource impairments.

IDNR anticipates that development, along with transportation and service corridor projects, to remain the foremost permitted activities requiring mitigation for aquatic resource impacts if the 404 permitting trends of the past 7 years continue.

Northeast Indiana is served by two major interstate highways, I-69 (North/South) and I-80/90 (East/West; the Indiana Toll Road), seven U.S. highways, and over twenty state roads. The interstate, U.S. highway, and state road systems provide connectivity throughout the region to nearly twenty major U.S. and Canadian markets within a 500 mile radius. Businesses in the region have a one-day drive by truck to more than 40% of the U.S. population and over one-fifth of the Canadian population. The roadway infrastructure, in addition to railroad access in the region, allow for significant intermodal transportation of freight in and out of the region. Roadways and associated infrastructure in the region are in need of improvement and regular maintenance. NIRCC's 2035 Transportation Plan addresses needs and plans for the next two decades (NIRCC, 2013).

There has been an emphasis on the development, connectivity and completion of trails and pedestrian facilities throughout the region resulting in many new trails as well as more under development or planned. Public utilities are underfunded and deteriorating, particularly sewer districts, and will require maintenance, upgrades, and expansion for population growth (NIRCC, 2013).

Economic growth goals and objectives for the region include improving and diversifying workforce skill sets to attract more companies across all industries, including expanding the manufacturing core. Other regional planning goals include transportation and infrastructure investments, improved affordable energy, effective public transit, and increased shovel-ready development sites (NIRCC, 2013). Additionally, threats to natural lakes areas within the SA and remaining wetland complexes due to growth and development, and agricultural lands uses are anticipated to continue as well. The Maumee SA has a low 6% forested land cover resulting in the threat of further reduction of forest ecological functions and services due to the ongoing identified major anthropogenic activities.

### **2.10 Offsets to Threats**

IDNR will apply the same restoration, enhancement and/or preservation approaches to offsetting the predominant threats in the Maumee SA that were stated in the statewide portion of the CPF. The SA goals and objectives further define the general types and locations of the aquatic resources IDNR will provide as compensatory mitigation based upon identified threats, historic loss and current conditions. See **Appendix C** for a summary of offsets per major anthropogenic category and a general matrix of offset measures for each of the predominant threats to aquatic resources throughout the SA and the state.

## **ELEMENT 3. HISTORIC AQUATIC RESOURCE LOSS**

The Maumee SA's historic aquatic resources were comprised of a diverse mix of natural aquatic communities and was predominately forested. Similar to the majority of the northern section of the state, aquatic resource loss is attributed to the land alteration for European settlement.

The eastern portion of the ancient Lake Maumee, considered the predecessor of Lake Erie, left behind a large forested wetland, named the Black Swamp by early settlers, when the lake receded (Homoya, Abrell, Aldrich, & Post, 1985). It was located in the northeast portion of Indiana and northwestern Ohio and was nearly destroyed due to clear cutting and land clearing. The Maumee watershed is the approximate footprint of the former Black Swamp. This extensive wetland was estimated to equal the size of Connecticut and was eliminated due to the barrier it created for travel and settlement (Dahl & Allord, 1996).

As settlement established within the area, the use of natural resources increased. Although agriculture dominates the landscape, transportation played a vital role for accessing markets and transport. The eastern central portion of the SA, contains Ft. Wayne, which became the regional epicenter of early European settlement. The Wabash and Erie Canal connected Ft. Wayne to Lake Erie, by following the Maumee River and it was considered the most important canal built within the state before the mid-1800s (The History Museum, 2017).

As the primary mode of transportation shifted to railroads, natural resource loss was accelerated. Railroads established transportation routes that provided access to new lands and a means for development; however, the railroad industry were direct consumers of wetland forest products, which fueled intense land clearing and timbering, from 1859 to 1885, resulting in elimination of most of the regions wetlands, including the Black Swamp (Dahl & Allord, 1996). Unfortunately, the majority of wetland complexes throughout the state suffered the same fate. By the beginning of the twentieth century, less than 4% of the Great Black Swamp remained due to drainage practices (Mitsch & Gosselink, 2000).

Due to extensive aquatic resource loss within the Maumee SA, the understanding of the regions aquatic resources and the natural communities in which they existed is best reconstructed by evaluating the identified Natural Regions and Sections, and their related natural aquatic communities, associated within each respective Region and Section. **Figure 46** below depicts each Natural Region and Section located within the Maumee SA and identified within the Natural Regions of Indiana journal. In addition to the natural communities, the utilization of studies on Indiana's historic vegetative cover and mapped hydric and partially hydric soils provide further insight into the general location and makeup of the historic aquatic resources that existed before early European settlement (**Table 39**). The table details the SA's estimated land cover percentages for each region and section, identified natural communities, estimated hydric and partially hydric soils, and estimated forest cover.

Natural Region(s)	Natural Region: Section(s)		Natural Region Community Types	Hydric Soils		Partially Hydric		Estimated Pre-Settlement Forest Cover
	Name	% Cover		Acres	% Cover	Acres	% Cover	% Forested
Central Till Plain	Bluffton Till Plain	64.0	Predominantly forested, along with minor areas of bog, prairie, fen, marsh and lake	176,777	21.5	452,164	55.1	84.1
Black Swamp	Black Swamp	18.6	Predominantly swamp forest; Typical streams are low-gradient, silty and shallowly entrenched					
Northern Lakes	Norther Lakes	17.4	Bog, fen, marsh, prairie, sedge meadow, swamp, seep spring, lake (Wet sand flats and muck flats), and various deciduous forest types; Typical streams are clear, medium to low-gradient, sandy gravel beds					

**Table 39. The historic natural community composition for the Maumee Service Area based upon the natural region and section**

# Maumee Service Area Natural Regions and Sections

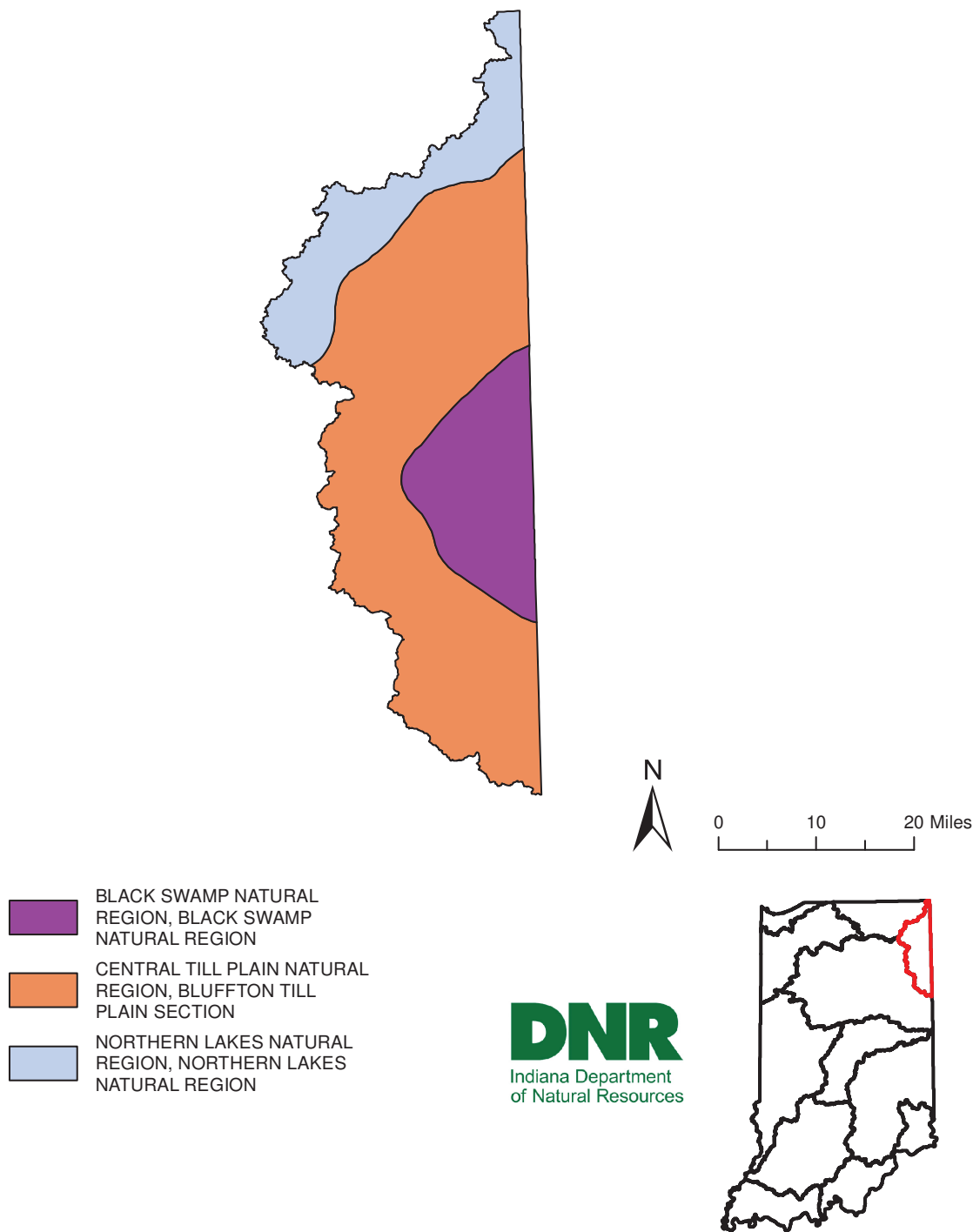


Figure 46. Natural regions and sections within the Maumee SA (Homoya, Abrell, Aldrich, & Post, 1985)

## ELEMENT 4. CURRENT AQUATIC RESOURCE CONDITIONS

### 4.1 Streams and Rivers

GIS analysis of 303(d) category 4A and 5 impaired streams (IDEM-IR, 2016) indicates there are currently 412 miles of category 4A impaired streams and 479 miles of category 5 impaired streams documented in the SA. IDEM reported E. coli (623 miles), impaired biotic communities (124 miles), nutrients (57 miles), PCBs in fish tissue (53 miles), and dissolved oxygen (35 miles) as current stream impairments within the SA. There are stream reaches in which multiple impairments may occur; therefore there is some overlap with the impaired stream miles.

As of 2014, IDEM conducted QHEI assessments of 141 stream reaches within the SA (**Table 40 and Figure 47**) (IDEM OWQ, 2014). Of the stream and river habitat reaches assessed, 23.4% are capable of supporting a balanced warm water community.

QHEI Score Ranges	Narrative Rating	Count	Percent of Total
<51	Poor Habitat	56	39.7
51-64	Habitat is partially supportive of a stream's aquatic life design	52	36.8
>64	Habitat is capable of supporting a balanced warm water community	33	23.4
	Total	141	100%

Table 40. IDEM overall QHEI scores for Maumee SA, 1991-2014 (IDEM OWQ, 2014)

As discussed in the statewide portion of the CPF, the functions and services provided by forests are important to the ecological health of aquatic resources in all portions of the SA that were historically forested. Analysis of the 2011 NLCD indicates that the Maumee SA ranks second least overall in forested cover density of all SA's at 8% of total area with approximately 65,603 acres, and is the SA with the second least forested cover of any SA at approximately 1.26% of 5,215,169 acres of forest cover statewide.

GIS analysis indicates that there are approximately 2,779,740 linear feet (526 miles) of stream located within 100 feet of agricultural fields. Under these criteria, the Maumee SA has the fourth highest ratio of these potentially restorable stream miles to square miles of SA at approximately 0.41 mile of potential restoration per one square mile, or one mile of potential restoration for every 2.44 square miles of SA.

## Maumee Service Area Qualitative Habitat Evaluation Index (QHEI) Scores

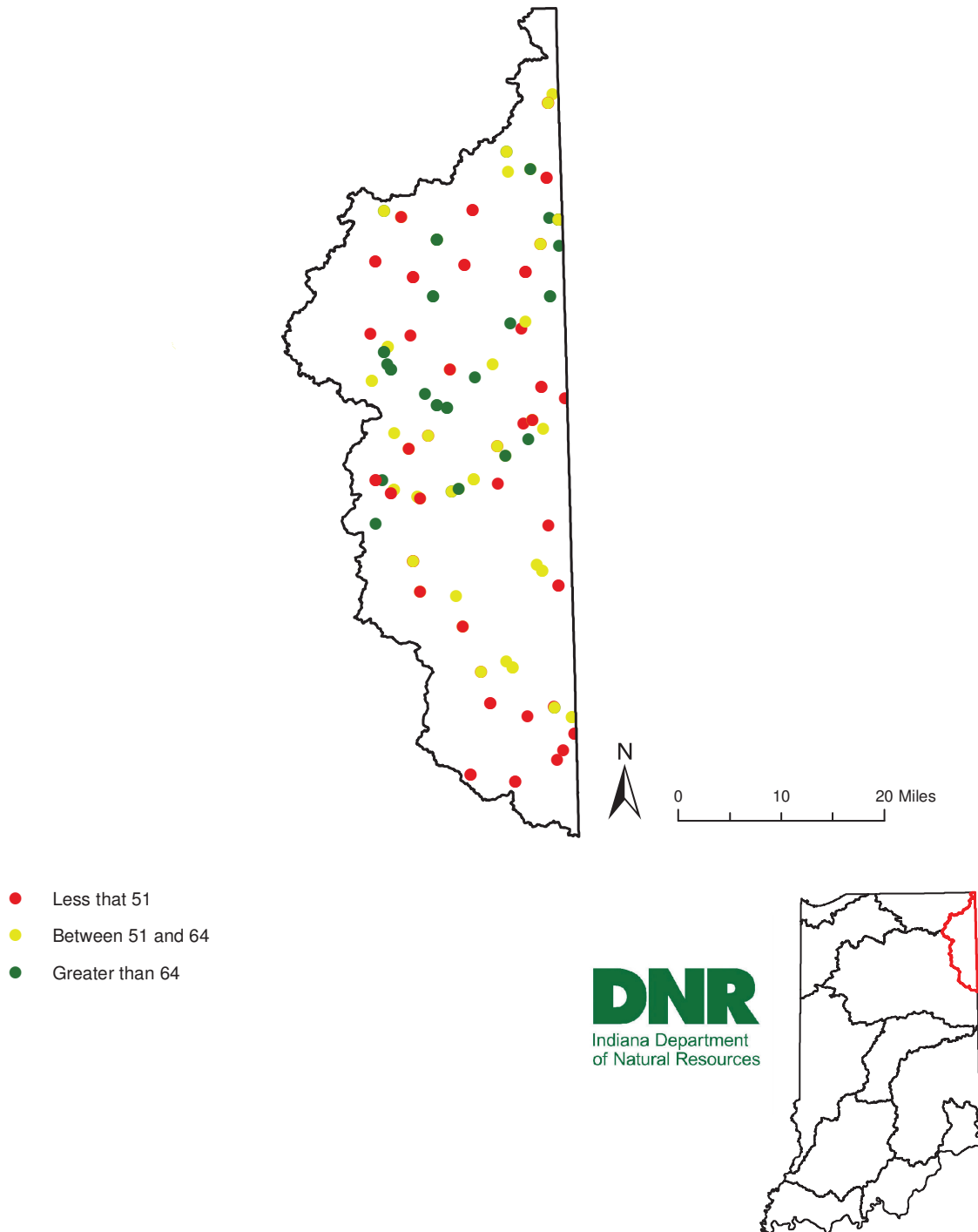


Figure 47. IDEM overall QHEI scores within the Maumee SA; 1991 – 2014 (IDEM OWQ, 2014)



## 4.2 Wetlands

Analysis of the NWI in the Maumee SA shows that there are approximately 6,715 acres of freshwater emergent wetland (PEM) and approximately 17,444 acres of combined freshwater forested (PFO) and scrub-shrub (PSS) wetlands, accounting for approximately 2.9% of the total SA acreage. All of the aquatic resource types from the NWI combined account for approximately 5.6% of the total SA (**Table 41** and **Figure 48**).

Aquatic Resource Type	Sum of NWI Aquatic Resource ACRES in SA	Percent of Total NWI Aquatic Resource Acres in SA	Percent of SA Total Acres	Percent of Total State Area –Acres
Freshwater Emergent Wetland	6,715	14.64%	0.82%	0.03%
Freshwater Forested/Shrub Wetland	17,444	38.04%	2.12%	0.07%
Freshwater Pond	6,047	13.19%	0.07%	0.03%
Lake	3,724	8.12%	0.04%	0.02%
Riverine	11,928	26.01%	1.54%	0.05%
Grand Total	45,858	100.00%	5.6%	0.20%

Table 41. Acres and percentage of acres of aquatic resource types from NWI analysis (USFWS NWI, 2015)

Hydric and partially hydric soils (NRCS-USDA, 2016) account for 461,284 acres (**Figure 49**), or 56.2% land cover within the SA, out of which approximately 441,306 acres have the potential to be restored, accounting for 53.7% of the total SA.

This was determined by mapping current hydric and partially hydric soils data with potentially restorable land cover types (e.g., cropland, pasture), excluding PFO, PSS and PEM wetlands from the NWI within agricultural land use. The Maumee SA has the highest percentage of recoverable wetland acres to total SA size of all SAs, and the sixth most total acres of potentially restorable wetland acres of any SA.

## Maumee Service Area National Wetlands Inventory

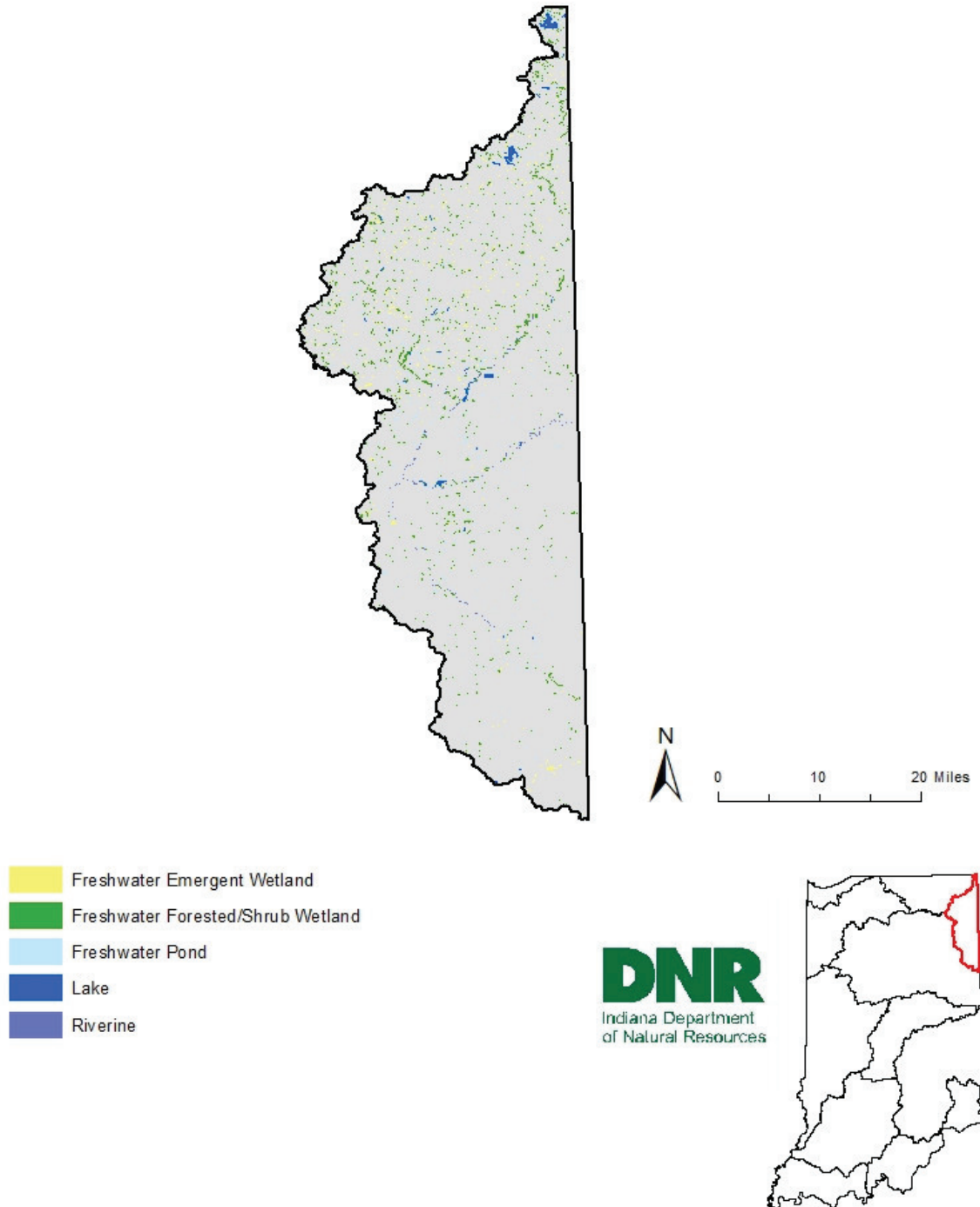


Figure 48. NWI within the Maumee Service Area (USFWS NWI, 2015)

## Maumee Service Area Hydric Soils

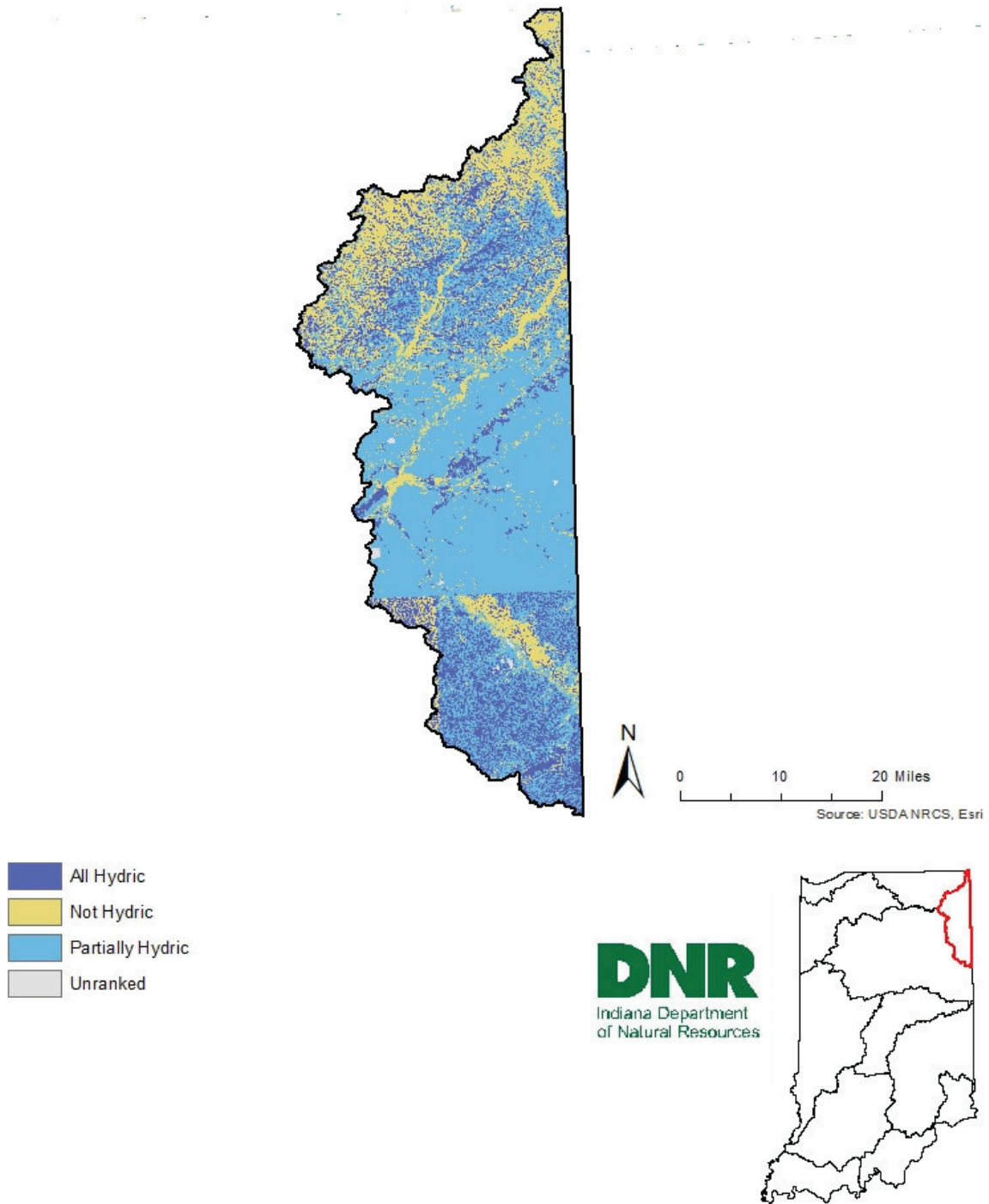


Figure 49. Hydric and partially hydric soils within the Maumee Service Area (NRCS-USDA, 2016)

### 4.3 Concentrations of Potentially Restorable Wetlands and Streams

GIS hotspot analysis was conducted to document concentrations of the identified potentially restorable wetlands and streams. Hotspots account for 330,730 acres of these potentially restorable wetlands within the SA. The watershed with the most hotspots of potentially restorable wetlands is Holthouse Ditch (HUC 041000040501 [Table 42]). There are 5,685 acres of hotspots of potentially restorable wetlands adjacent to the Baltzell-Lenhart Woods Nature Preserve.

Hotspots account for 1,111,924 linear feet of these potentially restorable streams within the SA. The watershed with the most hotspots of potentially restorable streams is Little Blue Creek (HUC 041000040404 [Table 43]). The watersheds with the highest concentrations of potentially restorable wetlands and streams (Tables 42 & 43) serve as the basis for identification of areas that have experienced the most recoverable aquatic resource loss with the SA. Figure 50 shows where these watersheds are located within the SA.

HUC 12 Code	HUC 12 Name	Hotspots of Potential Restorable Wetlands (acres)
041000040501	Holthouse Ditch	17,067
041000050105	Bottern Ditch-Maumee River	17,056
041000040406	Martz Creek	14,747
041000071204	Brown Ditch-Flatrock Creek	13,203
041000040403	Headwaters Blue Creek	13,057

Table 42. Watersheds in the Maumee Service Area with the most hotspots of potentially restorable wetlands

HUC 12 Code	HUC 12 Name	Hotspots of Potentially Restorable Streams (linear feet)
041000040404	Little Blue Creek	62,304
041000071204	Brown Ditch-Flatrock Creek	61,248
041000040501	Holthouse Ditch	54,912
041000040405	Blue Creek	51,216
041000040408	City of Decatur-St. Mary's River	49,104

Table 43. Watersheds in the Maumee Service Area with the most hotspots of potentially restorable streams

# Maumee Service Area

## Concentrations of Potentially Restorable Streams and Wetlands

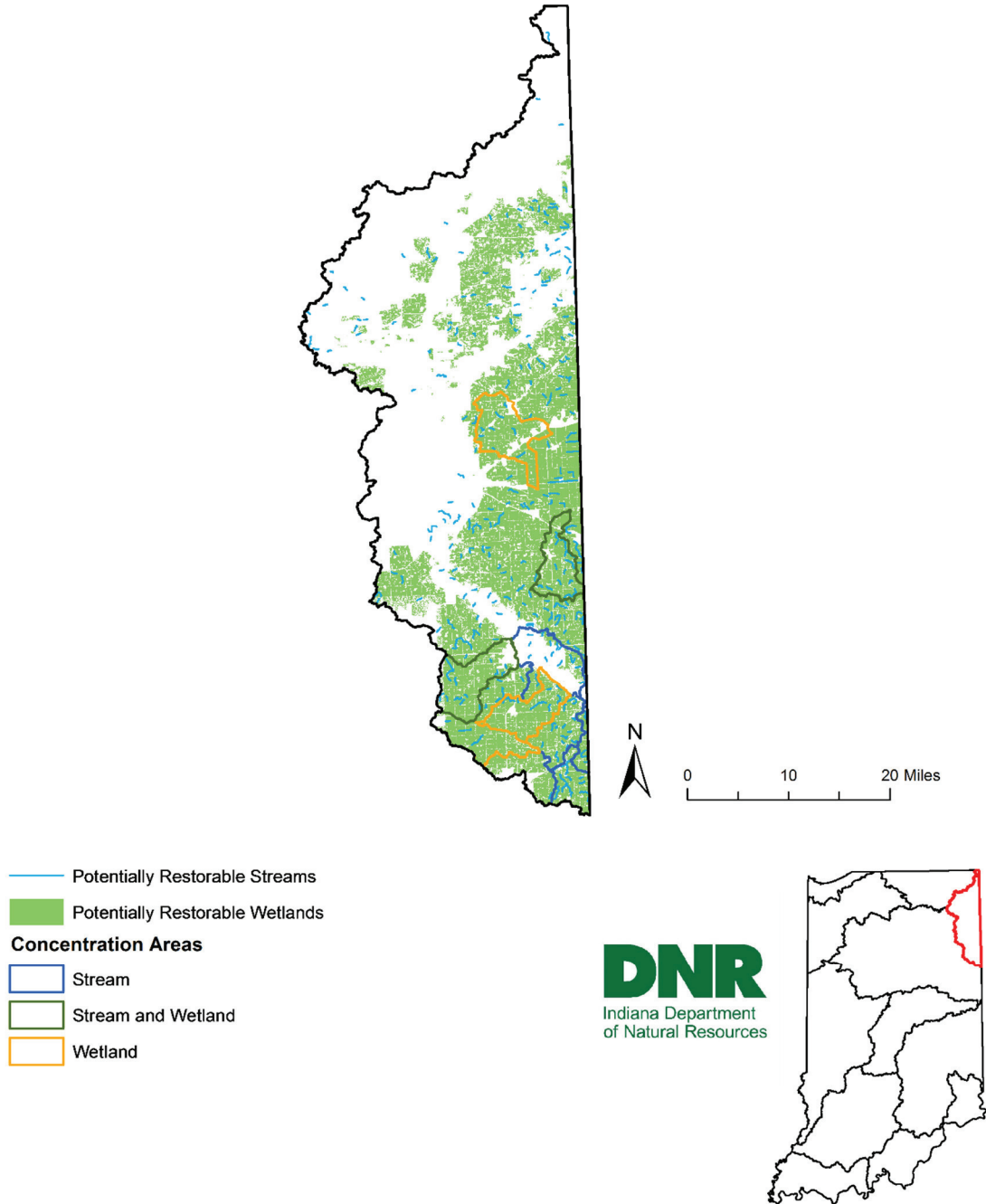


Figure 50. Concentrations of Potentially Restorable Streams and Wetlands in the Maumee Service Area

#### **4.4 Lakes, Reservoirs and Ponds**

GIS analysis of 303(d) lake impairments in the Maumee SA indicates there are four lakes currently documented having category 5 impairments, which measured using the National Hydrography Dataset (NHD) includes 794 acres with total mercury in fish tissue, 760 acres with PCBs in fish tissue, and 383 acres impaired with E. coli (IDEM-IR, 2016).

The 2011 NLCD identifies approximately 7,922 acres of open water which accounts for 1% of the SA. This varies slightly from the NWI, which identifies approximately 6,047 acres of freshwater ponds comprising 0.7% of the SA, and 3,724 acres of lakes comprising 0.5% of total SA acres. Of these open waterbodies, GIS analysis identifies approximately 21 natural public freshwater lakes (PFL) (IC 14-26-2-1.5) (IDNR DOW PD, 2016) within the SA, which is 5% of the PFL's as identified by the Indiana Natural Resource Commission list of public freshwater lakes as of June 2011 (IN NRC, 2011). Furthermore, GIS analysis indicates that approximately 251 acres of PFO, PSS and/or PEM from the NWI are contiguous with the boundary of PFL's as identified in the DNR DOW's GIS data (IDNR DOW PD, 2016) within the SA. Though Indiana does not directly border Lake Erie, the Maumee River is the largest drainage area contributing to this Great Lake (24% of contributing surface water), and is a significant source of sediment and nutrients that have contributed to the growing blue-green algal blooms and hypoxic zone in the western Lake Erie Basin (Quandt, 2012).

IDNR will remain up to date with PFL and reservoir condition data from sources such as IDEM, the Indiana Clean Lakes Program, watershed management plans, lake associations and the like as the landscape watershed approach is utilized to identify aquatic resource needs within the SA.

#### **4.5 Ground Water and Surface Water Interaction**

The data presented in this section will help identify potential areas in need of increased ground water recharge and/or identifying sensitive aquifers in need of increased buffering and protection from potential contamination threats.

Analysis of the near surface aquifer recharge rate data from IGS (Letsinger S. L., 2015) for the Maumee SA shows that approximately 98% of the shallow unconsolidated aquifers receive seven or less inches of ground water recharge annually (**Table 44**).


Recharge Rate	Inches/Year	Square Miles	Percent of Calumet-Dunes SA
	14	0.6	0.05%
	13	0.4	0.03%
	12	1.6	0.12%
	11	2.5	0.20%
	10	1.5	0.12%
	9	4.9	0.38%
	8	15.6	1.21%
	7	48.1	3.76%
	6	123.2	9.62%
	5	236.0	18.43%
	4	297.4	23.22%
	3	260.0	20.30%
	2	247.6	19.33%
	1	41.6	3.25%

Table 44. Approximate groundwater recharge rates in the Maumee Service Area (Letsinger S. L., 2015)

Analysis of the IGS near surface aquifer sensitivity mapping (Letsinger S. , 2015) indicates that approximately 86% of the Maumee SA's near surface aquifers are in the moderate to low range for sensitivity to contamination (**Table 45**). The aquifer sensitivity reflects the middle to lower range of aquifer recharge rates.

Sensitivity	Square Miles	Percent of Total Acre
Very High	8	0.63%
High	174	13.57%
Moderate	487	38.01%
Low	612	47.76%
Very Low	0.3	0.02%

Table 45. Groundwater sensitivity distribution in the Maumee Service Area (Letsinger S. , 2015)

Analysis of the IDNR Division of Water's Water Rights Section 2015 significant water withdrawal facilities data shows the Maumee SA has the third least registered capacity of surface water withdrawal of any SA, with a 2015 registered capacity of 14,690 million gallons a day (MGD) (**Figure 51**) (IDNR DOW, 2016). Public water supply accounts for approximately 94% of registered withdrawal capacity with industrial use accounting for the majority of the remaining withdrawal.



### Maumee Service Area 2015 Surface Water Use (Million Gallons Per Day)

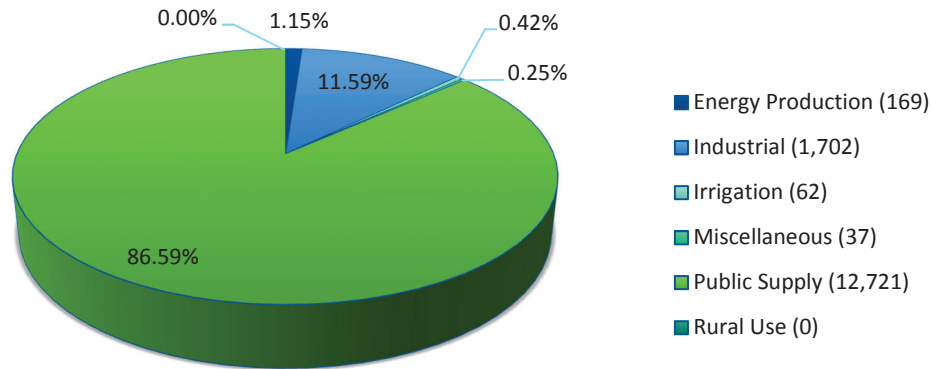


Figure 51. Significant Water Withdrawal Facilities-Surface Water (IDNR DOW, 2016)

Significant ground water withdrawal in the Maumee SA is the second least of any SA with a 4,293 MGD registered capacity (**Figure 52**). Public water supply and agricultural irrigation account for approximately 83% of registered ground water withdrawal capacity in the SA.

### Maumee Service Area 2015 Ground Water Use (Million Gallons Per Day)

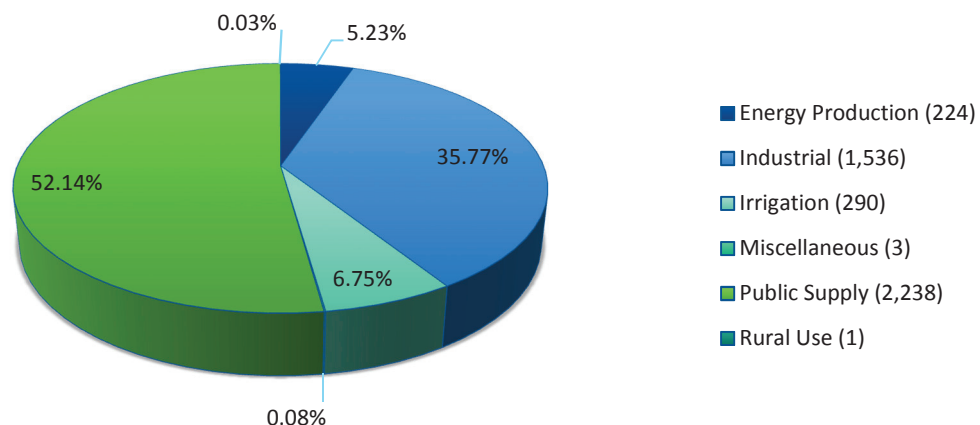


Figure 52. Significant Water Withdrawal Facilities-Ground Water (IDNR DOW, 2016)

#### **4.6 High Quality Aquatic Resources and Natural Communities**

In addition to previous eco and natural region descriptions of this SA, other high quality natural communities documented in the Natural Heritage Database within the SA include, but are not limited to, black swamp flatwoods, fen, forested fen and shrub swamp, in addition to many other transitional, mixed or upland communities.

There are currently five amphibian species, 47 bird species, 10 fish species, 11 mammal species, eight mollusk species, and nine reptile species listed as SGCN within the Indiana SWAP Great Lakes Planning Region (SWAP, 2015) which includes the Maumee SA.

#### **ELEMENT 5. AQUATIC RESOURCE GOALS AND OBJECTIVES**

Aquatic resource goals and objectives identified in the statewide CPF also apply to the Maumee SA. The following aquatic resource goals and objectives apply specifically to the Maumee SA based on 404 permitted impact trends, predominant threats, historic loss, current impaired and high quality aquatic resource conditions, habitats and SGCN, and current and future priority conservation areas. The general amounts of aquatic resources IDNR will seek to provide will depend on ILF credit demand.

1. Restoration, enhancement and preservation of aquatic resources to help offset the dominant and anticipated threats in the SA.
2. Implement stream and wetland restoration, enhancement and/or preservation projects that contribute to improvements to watershed functions and services as well as Lake Erie water quality; preserve and buffer high quality threatened habitats unique to the Great Lakes Region that are not yet protected such as remnants of the Black Swamp and those identified in the Great Lakes Restoration Initiative.
3. Re-establishment of historic aquatic resources that have experienced high concentrations of loss, fragmentation and/or impairment, such as the identified concentrations of potentially restorable streams and wetlands to include any channel restoration needs.
4. Implement projects within and adjacent to current and future areas identified as conservation priorities by federal, state and local government entities, and non-governmental organizations (stakeholder involvement/conservation partnerships).
5. Preservation of rare and high quality aquatic resources; critical habitat for rare and endangered species; priority habitat for species of greatest conservation concern; and/or other areas meeting the requirements of 33 CFR §332.3(h).
6. Implement natural stream channel restorations in order to help offset chemical, physical and biological impairments and degradation resulting from anthropogenic activities to include considerations such as in-stream habitat, physical integrity, riparian cover, and potential removal or modification of dams.
7. Target stream, riparian and wetland restoration, enhancement and/or preservation projects in urbanized areas acknowledging the challenges and constraints that will likely occur within intensely developed areas in this SA.

8. Support critical habitat restoration for federal and state listed SGCN within and adjacent to aquatic resources while applying the SWAP identified conservation needs and actions in the Great Lakes Planning Region where feasible.
9. Restoration of riparian and lacustrine wetlands to offset threats to, and improve functions and services of, aquatic resources that will improve connectivity of formerly extensive wetland and natural lake complexes throughout the SA that have been degraded by, and/or lost to, conversion.

## **ELEMENT 6. PRIORITIZATION STRATEGY**

The four steps below present the prioritization criteria for mitigation site identification and selection. This prioritization strategy will be used for project selection within each SA. When prioritizing sites for mitigation projects, the following core criteria shall be utilized.

1. Mitigation site proposals must contain the ability to result in a successful and sustainable net gain and/or preservation of aquatic resource functions and services and/or result in no net loss of Indiana's aquatic resources.
2. Prioritization will be given to compensatory mitigation projects that provide the greatest benefit to the Maumee SA, by providing the greatest lift in aquatic resource functions and services based upon the specific needs identified within the SA and/or watershed utilizing the watershed approach for site selection.
3. Project proposals will consider how to offset the anthropogenic threats to aquatic resources, historic loss, and existing and future impairments while achieving IN SWMP goals and objectives, within the SA.
4. Other prioritization evaluation criteria may include, but are not limited to; cost, feasibility, size, proximity to other conservation lands or protected areas, connectivity or location with respect to corridors, human use value, and efficient long term maintenance.

In addition to the Core Criteria, information from conservation partners, landowners and additional stakeholders may also be utilized during the site selection process as they may have additional data or a pre-existing list of priority restoration projects. Ground investigations will be required to confirm or dismiss these datasets and determine the best locations for compensatory mitigation project sites.

Currently, the following watershed plans exist within the SA: Cedar Creek WMP, St. Joseph River (Maumee) WMP, Lower St. Joseph River-Bear Creek WMP, St. Joseph River Watershed Initiative WMP, and St. Mary's WMP. However, IDNR will utilize the most current watershed planning information that is available as these plans are updated and/or new watershed plans are developed within this SA over the life of the program.

## **ELEMENT 7. PRESERVATION OBJECTIVES**

When applicable under 33 CFR §332.3(h) of the Federal Mitigation Rule, preservation objectives within the Maumee SA will include rare and high quality natural aquatic and riparian communities, waters having a significant contribution to ecological sustainability, and important habitat for SGCN while addressing the physical, chemical, or biological functions provided to the watershed that address

critical conservation needs throughout the service area. Additionally, there will likely be aquatic resource and habitat preservation and/or enhancement opportunities in conjunction with the primary objective of restoration to be determined on a per project basis and approved by the DE.

## **ELEMENT 8. PUBLIC AND PRIVATE STAKEHOLDER INVOLVEMENT**

Coordination with the Maumee River Basin Commission (MRBC) for projects within this SA will also be pursued. Currently, the MRBC has a voluntary agricultural land-use conversion program that includes wetland restoration. Coordination with this program and their local landowner contacts could provide added value in this SA.

Currently, the following land trusts exist within the SA: Wood-Land-Lakes RC&D Council, Blue Heron Ministries, Steuben County Lakes Council Land Trust, and ACRES Land Trust. There is the potential for land trusts to dissolve, adjust their geographical boundaries, and for new land trust organizations to be created within the SA. IDNR will work with the land trusts that exist in the SA over the life of the program.

- Region III-A Economic Development District and Regional Planning Commission
- Northeastern Indiana Regional Coordinating Council
- Maumee River Basin Commission
- Municipal Separate Storm Sewer Systems (MS4) Communities
- Municipal and County governmental entities
- Save Maumee
- Upper Maumee Watershed Partnership
- Soil and Water Conservation Districts
- Western Lake Erie Basin Partnership
- USGS Indiana Water Science Center
- USGS Great Lakes Science Center
- USGS Michigan Science Center
- USGS Ohio Water Science Center
- Upper Midwest and Great Lakes, and Eastern Tallgrass Prairie and Big Rivers Landscape Conservation Cooperatives
- Steuben County Lakes Council
- Indiana Lakes Management Society
- Western Lake Erie Basin Initiative-NRCS

Currently known public, private and non-profit conservation priority areas as identified by the 2015 IWPP (IWPP, 2015) are shown in **Figure 53** below.

# Maumee Service Area High Priority Aquatic Resource Conservation Sites

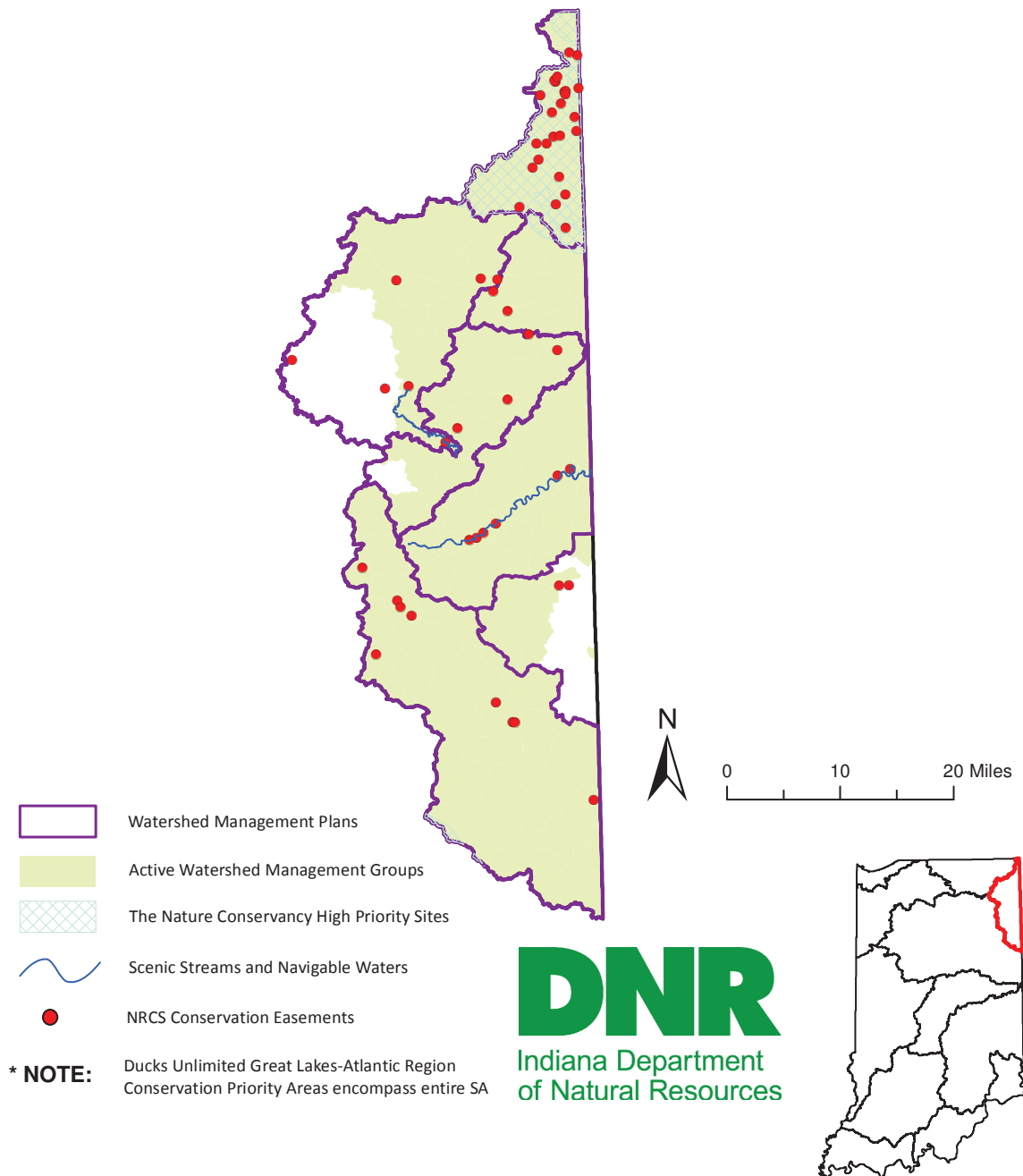


Figure 53. High priority aquatic resource conservation areas and sites within the Maumee Service Area (IWPP, 2015)

## **ELEMENT 9. LONG TERM PROTECTION AND MANAGEMENT**

Long term protection and management strategies will be conducted in the same manner per SA as outlined in the statewide CPF.

## **ELEMENT 10. PERIODIC EVALUATION AND REPORTING**

Periodic evaluation and reporting on the progress of IN SWMP will be conducted in the same manner per SA as outlined in the statewide CPF.